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ABSTRACT

In a verbal memory study of language development, third- through sixth-grade children read and orally recalled short, expository passages which were presented in three syntactic paraphrase forms: (1) complex sentences with preverbal elaboration such as complex subject nominalizations and relative clauses, (2) complex sentences with postverbal elaboration, and (3) simple sentences. Syntactic analysis of the children's best recall samples (those showing high semantic recall) revealed that third through fifth graders tended to paraphrase the target information in simple sentences, regardless of the complexity of the material they had read. Sixth graders, however, maintained the original syntax more often than younger subjects, suggesting a better recall memory for syntactically complex features of discourse. The results corroborate previous findings showing that children's speech in the upper elementary grades shifts towards greater structural complexity. As suggested by Ingram (1975), such a shift may reflect important developmental changes in the linguistic strategies children use during this age range for producing complex sentences in connected discourse. (Author)

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THE RELATIONSHIP OF FORM AND CONTENT IN CHILDREN'S DISCOURSE PARAPHRASES[1]

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David Ingram (1975) has claimed that transformations resulting in complex sentences are acquired gradually as fully productive rule strategies between the ages of six and twelve, that is, during the elementary school years. Ingram's claim is supported by data from the classic observational studies of the speech of elementary school children reported by Loban (1963, 1976) and O'Donnell, Griffin and Norris (1967). In both of these studies children were asked to describe a visually presented stimulus such as a set of pictures or a silent narrative film. The resulting speech samples were compared on the basis of numerical indices of sentence complexity, such as the average number of words or clauses per sentence. The general developmental picture that emerges from these studies is that as children mature they tend to use longer and more complex sentences containing more information expressed in embedded structures. For example, the frequency of embeddings in children's speech generally showed increases from one grade level to another, with a particularly accelerated period of growth occurring between grade five and grade six or seven.

Frequency data derived from these observational studies provide only limited evidence for evaluating Ingram's claim that productive rules for complex syntax are acquired during the elementary school years. The frequency data do show an increasing distribution of complex syntactic forms in speech samples, but they do so without considering the children's communicative intent, that is, the content of the information expressed.

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Since content is extremely variable even in rather structured interactions, syntactic variation across speech samples at various ages may result from differences in underlying information complexity as well as from different rule strategies. This means that older children may use more complex sentences than younger children because they choose to talk about more complex aspects of the stimulus situation. Thus, it is necessary to control for semantic content in order to ensure adequate comparability among speech samples.

This paper describes an experimental approach to the question of whether productive rule strategies for complex sentences are developed during the elementary school years. The study was carried out in the context of a larger inquiry focusing on children's comprehension and oral recall of differently paraphrased samples of written discourse (Note 1). These experimental conditions permitted us to observe children's speech complexity in a context that reduced variability in content across oral productions. The use of a verbal stimulus allowed greater specification of the intended information content than would have been possible using nonverbal presentations such as pictures. In addition, variability in content was further reduced by selectively analyzing only those recall protocols that met a criterion in terms of the amount of relevant information expressed. By using information content as the criterion for selection of the data, we ensured that output content was similar across speech samples.

Although language stimuli may help to reduce content variability, their use creates a problem which is avoided by nonverbal representations

of content. The dilemma is that language stimuli convey syntactic structure which may serve as a model for recall, thereby reducing structural variability (the speech production measure of interest) as well as content variability. This problem was solved by introducing structural variation as an independent variable. The stimulus passages were presented in three syntactically paraphrased versions which sampled the range of syntactic structures we hoped to observe in the children's speech.

One of the three paraphrased versions contained only simple sentences. The other two contained complex sentences in which one of the noun phrases was elaborated typically by a nominalization or a relative clause. The two versions with complex sentences were differentiated on the basis of the constituent function of their complex noun phrases. In one case, elaborated noun phrases functioned as the surface subject of the matrix sentence in which they were embedded. In the other, syntactic complexity was associated with the object or with some other noun phrase occurring after the verb. Examples of this distinction were cited by Menyuk (1969) in comments about some important developments in children's speech during the early school years. Sentences like I know the boy who is sick or I like painting contain a complex noun phrase functioning in an object or post-verbal position. Menyuk pointed out that these types of embeddings appear earlier in children's speech and are used more frequently than otherwise similar sentences in which the embedding occurs pre-verbally as in The boy who was sick is back at school or Painting is fun.

An important characteristic of sentences with complex subject noun phrases is that they intrude lexical information between the subject noun head and the associated verb. This intrusion of information contained in the complement causes an interruption in processing the subject-verb relation. As pointed out by de Villiers, Flusberg, Hakuta, and Cohen (1979), the comprehension difficulties associated with such structures are presumably due to this interruption. The interruption between subject and verb is most striking in nested constructions, but it occurs in many subject nominalizations as well. We refer to this general class of constructions as interrupted sentences. In contrast, sentences with complements embedded post-verbally do not produce an interruption between the surface subject and verb. We refer to the latter class of complex sentences as Uninterrupted. These three sentence types (Simplex, Interrupted, and Uninterrupted) describe the syntactic paraphrases of passages the children read. The same categories of syntactic structure were used to analyze the children's oral recalls.

We hypothesized that the speech of children in the upper elementary grades shifts towards greater syntactic complexity, as claimed by Ingram (1975). To test this hypothesis, we analyzed the forms used by third through sixth graders when recalling passages presented in each of three syntactic input conditions. We expected that the fifth and sixth graders would use more complex syntax than the younger children in all three input conditions. As a result, they would be more likely to preserve the input complex syntax in their recalls than would third and fourth graders. The third and fourth graders, on the other hand, would tend to use a simple syntax regardless of input format.

The data analysis focused on the interaction of three major variables: input form, output form, and grade level. Log linear analysis of the frequency data (Dixon & Brown, 1979; Note 2) showed that there were significant main effects associated with output form and grade level, but not with input form. All interactions were significant except for the three-way Input X Output X Grade interaction.

The relationship between input and output is displayed graphically in Figure 1, with data aggregated across grades.

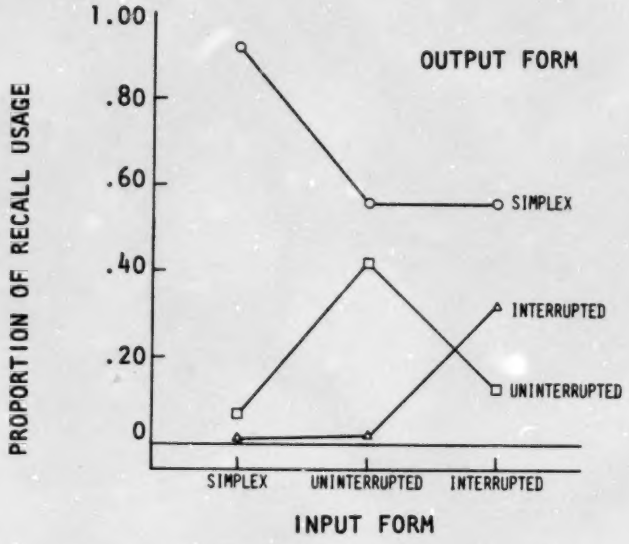

Figure 1. Output form (recall) as a function of Input form (text).

The graph shows the relative frequency with which children used each syntactic form as a function of the input text treatment. When expressing information that had been presented in simple sentences, the children used simple sentences in almost all instances (92%). When

the material was presented in either of the two complex sentence forms, the children still used simple sentences more than half of the time (56%) in their oral recalls. Thus, across the three input conditions the children used simple sentences as the primary vehicle for paraphrasing the information. This reflects a general tendency to shift the syntax in the direction of simple sentences; that is, to use a simplification strategy during sentence production. Examples of this strategy usage are shown below in Table 1.

Table 1. Examples of syntactically complex passage excerpts which were recalled in the form of simple sentences.

Input (Text) Form	→	Output (Recall) Form
Complex Uninterrupted		Simplex
Palm trees are an ancient group of plants whose fossils have been found in all parts of the world.		Palm trees are ancient group of plants. Their fossils are found all over the world.
Complex Interruped		Simplex
India, having had many rulers, became free at last thirty years ago.		India had a lot of rulers. And finally it got free.

In spite of the general trend toward simplification, Figure 1 also shows that the form of the input did exert some influence on the recall syntax used by the children. There was a tendency for children to match the input form in their recalls. This syntactic correspondence between text and recall is shown by the fact that the frequency of each paraphrase type produced by the children always peaks sharply in the corresponding input condition. For example, the peak output frequency of Uninterrupted structures, 42%, occurred when subjects recalled texts

that had been presented as Uninterrupted sentences. Moreover, Uninterrupted complex syntax was not used in recall to any prominent extent elsewhere. This effect shows that the children were sensitive to the syntax of the passages they read and that the original syntax influenced their recalls. This strategy of maintaining the original syntax is illustrated by the following examples.

Table 2. Examples of recall which matched the original text excerpt in general syntactic structure.

Input (Text) Form	→	Output (Recall) Form
Complex Uninterrupted		Complex Uninterrupted
Northern fur seals have strong, wide flippers for front feet, making them very powerful swimmers.		Northern fur seals have strong, wide flippers for front feet, which makes them very powerful swimmers.
Complex Interrupted		Complex Interrupted
Vitamin C, which lemons are full of, was the secret.		But the vitamin C, which lemons are full of, was the cure.

The results show that children used two strategies. One was a simplification strategy whereby the input syntax was restructured in the form of simple sentences. The other was a strategy of remembering and maintaining the original syntax regardless of its complexity. Combined among the subjects sampled, these two strategies appear to produce a relation between input and output which underlies the significant Input X Output interaction. The absence of a significant Input X Output X Grade interaction suggests that the overall recall pattern did not differ in any essential way by grade level, thereby failing to support the hypothesis. But, as revealed in Figure 2 below, developmental differences in the pattern of the Input X Output interaction were present in the data, although they did not result in a statistically significant effect.

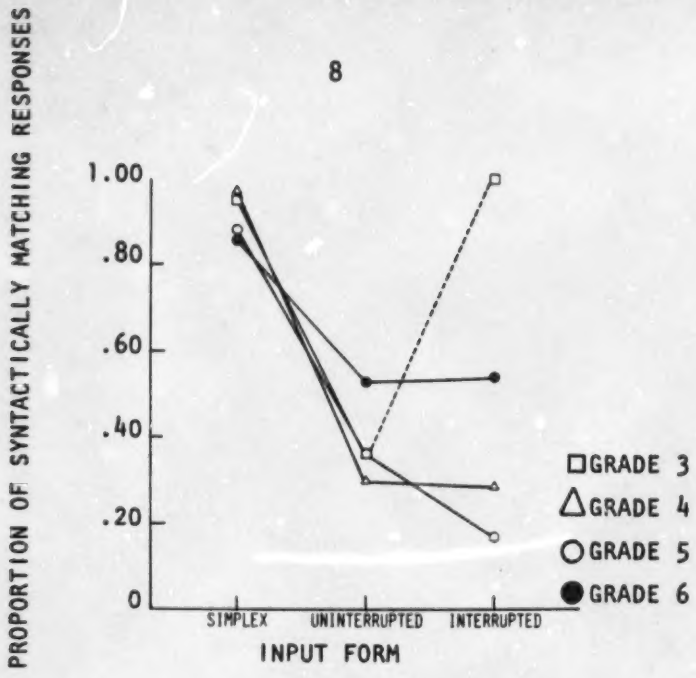

Figure 2. Proportion of responses in which the Output (recall) form matched the Input (text) form, by grade level.

Figure 2 shows the proportion of responses that maintained the original syntax in each Input treatment and at each grade level. For example, when sixth graders read passages in the Uninterrupted input condition, they maintained the original complex syntax a little more than half of the time in their recalls.

The pattern at all grades is relatively consistent except for the anomolous data point for third graders shown in the upper right-hand corner of the graph. In this instance, the third graders recalled too little information to establish a reliable trend.[2] Except for this one instance, the graph shows that the frequencies of structures syntactically matching the input were always highest in the Simplex condition, where

[2]We indicate our lack of confidence in this data point by drawing the connecting line on the graph with a dashed rather than solid line.

the simplification strategy and the maintain-the-syntax strategy were not in conflict. However, when recalling the syntactically complex versions, the children maintained the original syntax only about one third of the time, except in the case of sixth graders, who maintained the complex syntax more than half of the time. This suggests that the oldest children were more sensitive to the form of the discourse than younger subjects and were more successful in using a strategy of recalling the material in a relatively unaltered syntactic form.

Summarizing these findings, it appeared that children at all grade levels used the same two strategies. They paid attention to the form of the text and maintained this form in their recalls, and/or they simplified the original form and expressed the underlying information in simple sentences. These strategies accounted for over 90% of responses at every grade level. The sixth graders, however, appeared to remember the complex syntax much better than the younger children did. This suggests that the greatest developmental difference between the sixth graders and younger children was a difference in their immediate recall memory for syntactic versus semantic features of connected discourse.

Because of the data selection criteria, the recall samples used in this study were characterized by a uniformly high level of semantic recall. However, most of the children, particularly younger subjects, recalled the complex sentences in a syntactically altered form. Thus, recall of the text <u>form</u> was relatively low. This disparity in recall of semantic versus syntactic features of text is consistent with the verbal memory studies of Sachs (1967, 1974), Mehler (1963), and Kintsch (1974), which show that subjects remember the <u>meaning</u> of discourse

much better than the exact wording or the syntax in which the material was originally presented. This separation of syntax and semantics in discourse comprehension is accounted for by the "levels of processing" framework (Craik and Lockhart, 1972), which posits different memory representations for syntactic and semantic aspects of discourse, each having different retention characteristics. The surface form of sentences is rapidly forgotten once the more durable representation of meaning has been established in memory (Sachs, 1967). As a result, subjects are able to remember surface features of text immediately after presentation but not after brief delays. The simplification strategy observed in this study is consistent with the behavior of adults when recalling discourse after brief delays. Under these conditions, subjects must construct a new syntactic representation from semantic memory, and this new form is likely to differ from the one in which the information was originally expressed.

In immediate recall, however, adults can remember considerable portions of the surface text, especially when the task encourages them to so. For example, Lucas (Note 3) found that when adults were anticipating a free recall post-test of reading comprehension, they tended to recall passages in a form that matched the original syntax. This sensitivity to the form of the passage as well as to its content shows that adults are able to remember surface features of prose and access them in immediate recall. The present study indicates that children in the upper elementary grades begin to shift their recall strategy in the direction of that employed by adults, that is, by showing a greater sensitivity to the form of the discourse and a more stable memory capacity for its surface features.

Finally, these results appear to have implications for the question that the study was intended to address, that is, developmental syntactic skills in elementary school children. This study shows that when the content of discourse is controlled across samples, the speech of elementary school children still shows a developmental trend toward greater use of complex syntax, although this development was observed only at grade six. The remarkable ability of sixth graders to remember syntactically complex features of discourse may be one of the correlates of their greater control over production of complex syntax which has been inferred from observational studies. Although this conclusion must be very tentative at present, the results of this study show that experimental techniques using a verbal memory paradigm may serve as a valuable adjunct to observational approaches, and contribute new insights to the study of child discourse.

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